

SOME NEW CADDIS FLIES (TRICHOPTERA) FROM
THE WESTERN CAPE PROVINCE — III

By

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(With 8 figures in the text)

INTRODUCTION

This is the third paper in the present series, in which caddis flies from the western Cape are being described. In it an account is given of the larval and pupal stages of the three new species of Leptoceridae described in Part II (*Athripsodes prionii*, *A. bergensis* and *Leptecho helicotheca*); the pupal skin of *Athripsodes tuckeri* (Barnard) ? var. is also described, and all stages of a small species of *Setodes*, *S. barnardi*, from the Great Berg River, which appears to be new. The immature stages have been described in considerable detail with the object of collecting sufficient information to build up keys for the identification of larvae and pupae collected in field surveys.

The methods employed have been the same as in previous papers, and, as before, holotypes will be deposited in the South African Museum, and paratypes will be sent to the British Museum (Natural History). Terminology as before, except that Ross's term 'stridulator' is used instead of the more cumbersome 'plaque d'appui' (Barnard), or 'process of the trochantin' (Ulmer). A full description of the habitats of the species described will be found in Harrison and Elsworth (1958) and Harrison (1958). (See addendum to the latter paper for names used.)

The author would like to express her grateful thanks to Mr. D. E. Kimmins of the British Museum (Natural History) for much helpful advice, also to Dr. A. D. Harrison of the National Institute for Water Research, and to Professor J. H. Day of the Zoology Department, University of Cape Town, in whose department the work was carried out.

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DESCRIPTION OF IMMATURE STAGES

Athripsodes prionii Scott

Fig. 1 A-R; Fig. 5 K-Q

Remarks: Larvae were collected from the Palmiet River at Elgin in October and November, and from the Great Berg River near Assegaibos, *Ann. S. Afr. Mus.* 46 (2), 15-33, 8 figs.

Driefontein, Groot Drakenstein and Bridgetown between April and October. The only place at which they were common was at Groot Drakenstein in autumn (April and May). The larvae are swimmers and live mainly among the marginal vegetation, particularly the palmiet (*Prionium serratum*).

Larva (Fig. 1 A–M): Described from entire specimens. Case-bearing swimming larvae; eruciform; length up to 8.0 mm. *Head*: hypognathous, oval, clypeus somewhat asymmetrical with 2 pairs of lateral indentations and 10 bristles, a suture-like line present paralleling the epicranial arms; gular sclerite pear-shaped, not fused with genae. Head golden brown with darker brown patterning as indicated in figure 1 A–E. Anteclypeus membranous, pale. Eyes large, black, set in a clear pale area, with 6 raised transparent cuticular plates over each forming hyaline lenses. Antennae conspicuous, with bulbous proximal segment and long distal segment terminating in a sensory bristle. *Mouthparts*: labrum armed with 4 blade-shaped spines and 6 long setae, there are also 2 pairs of very short spines just below the central emargination. Mandibles unequal in size, dark brown, heavily sclerotized; each mandible with 5 teeth, 2 small brushes of stout bristles on the inner face of the larger left mandible. Maxillary palps 3-segmented, 3rd segment bearing several small papillae; maxillary lobe bordered with long blade-like spines, smaller spines and setae. Labium a low cone, labial palps each tipped with a papilla. *Thorax*: pro- and mesonota sclerotized, patterned with darker brown and cream as indicated in figure 1 B; metanotum membranous except for 2 small oval patches bearing setae. The patterning on both head and thoracic nota is variable, as is the ground colour, which varies from dark brown, when the pattern scarcely shows, to pale yellow, when it shows up very clearly. Each half of the pronotum is subdivided by a groove. The mesonota are lightly sclerotized, with a pair of narrow dark bars. The metathorax bears what appear to be 2 small gills on each side (fig. 1 A). *Legs*: prothoracic legs short, stout; tibia and tarsus edged with spines; bristles, spines and hair-like setae fringe the femur. Stridulator stout, with blunt apex. Mesothoracic legs armed with strong spines, interspersed with hair-like setae along edge of femur. Metathoracic legs long, strong, with heavy double fringe of long hairs used in swimming. All leg joints of one segment only except trochanters which have two; femora of mid- and hind-legs also appear to have two segments, though it is not clear whether this division is functional or merely incipient. Coxopleurites, trochantin etc. of legs heavily sclerotized. *Abdomen*: white; on segment 1 lateral humps covered with small scabrosities, and a prominent dorsal hump bearing a patch of spicules; on segment 2 a small sclerite on each side and 3 simple filiform gills (presegmental dorsal and ventrolateral gills, and a postsegmental lateral gill); on segments 3 and 4, 2 gills (presegmental dorsal and ventrolateral); no gills on segments 5–9. Lateral line extends from segment 3 to 7; on segment 8 it is replaced by a row of small bifid tubercles. Segment 9 is membranous but the tergite is bordered posteriorly with a row of 6 strong black bristles. The anal prolegs are fused basally to form a 10th segment; each is short and bulbous with a lateral sclerotized patch and several

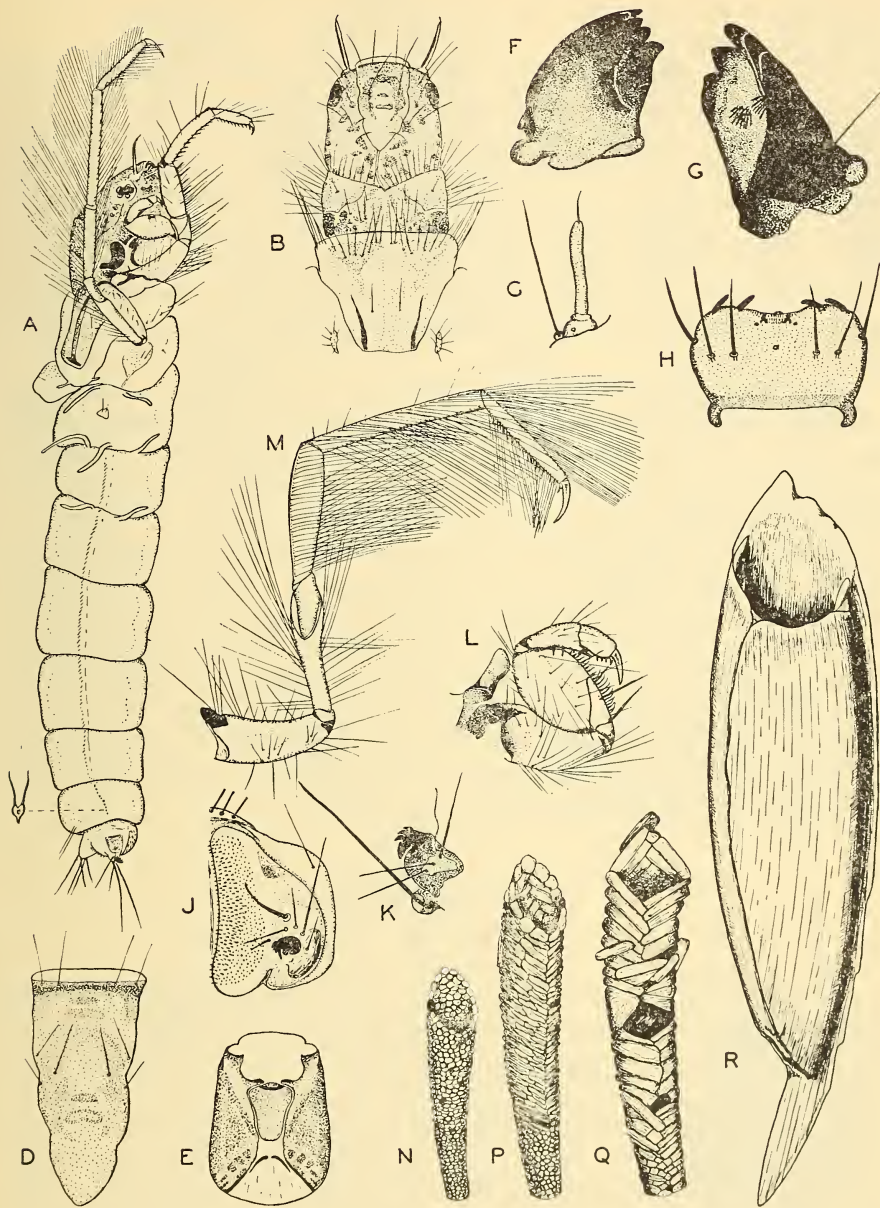


FIG. 1. Larva of *Athripsodes prionii* Scott.

A, lateral view of whole larva, with lateral tubercle enlarged. B, dorsal view of head with pro- and mesonota. C, antenna. D, clypeus. E, head from behind showing gular sclerite. F, right mandible. G, left mandible. H, labrum. J, posterior end of larva (right side). K, anal claw. L, prothoracic leg. M, metathoracic leg. N, case of early instar of larva. P, Q, cases of later instars. R, case of mature larva.

stout black setae; anal claws have 4 barbs (1 large and 3 small); anus flanked by patches of small spicules.

Case (fig. 1 N-R): Tubular, wider at anterior end, with hood. Small larvae make their cases of sand grains, lining them with secretion; older larvae utilize small bits of vegetable debris, charcoal, etc., with a few sand grains at the posterior end; mature larvae make a very characteristic rounded case from 3 neatly shaped pieces of dead leaf (usually of *Prionium serrata*); one piece is always longer than the others and forms a hood at the anterior end of the case and a projecting strip at the posterior end. The case is lined with secretion and may be neatened round the front and hind openings by the addition of a few small bits of leaf glued on with secretion; there is always a neat round hole at the posterior end.

Pupa (fig. 5 K-Q): Labrum rounded, rising to a low point; setae comparatively short, some recurved; mandibles large, strong, inner edge finely serrated, outer edge sinuous, ending in a strong condyle, one pair of lateral setae. Antennae much longer than body, distal ends coiled. Fore-tarsi slightly, mid-tarsi heavily, fringed. Dorsal plates present on abdominal segments as follows: on segment 1, 2 pairs of protuberances covered with small sclerotized points (these point in opposite directions in each pair); on segments 3 and 4, 1 pair of hook-bearing plates; on 5, 2 pairs; on 6, 1 pair. Segment 9 bears a pair of small lappets tipped with forwardly directed setae. The plates on 3 and 4 each have 3 hooks, the anterior plates on 5 and those on 6 each have 2 large hooks and 3-4 smaller ones. There are minute scabrosities scattered on the dorsal surface of the abdomen. Lateral lines extend from segment 3 to 8, where the two curl round and meet ventrally. Anal appendages are long and stout, with rounded tips; along the inner edges are small barbs and a few setae.

Athripsodes bergensis Scott

Fig. 2 A-L; fig. 5 A-J

Remarks: The larvae are common in the Great Berg River near Driefontein and Groot Drakenstein in the late winter and spring (August to October). They are crawlers with long, slender, rough-looking cases of brown sand-grains to which pieces of stick or charcoal are often attached, and they are frequently to be seen crawling actively about on top of the stones seeking food. They are carnivorous and in captivity must be given insect larvae or other small animals to eat to prevent cannibalism. It is possible that the sticks etc. attached to their cases serve to discourage predatory fish, as in the case of *Anabolia nervosa* in Britain. Pupae were found in October, clustered in numbers under marginal stones; some were collected and bred out in the laboratory. The pupal cases are not larval cases sealed off, but each is constructed from small white sand-grains at the end of the old larval case, being first formed as an extension of it. When completed however the pupal case is closed off at each end by a neat lid

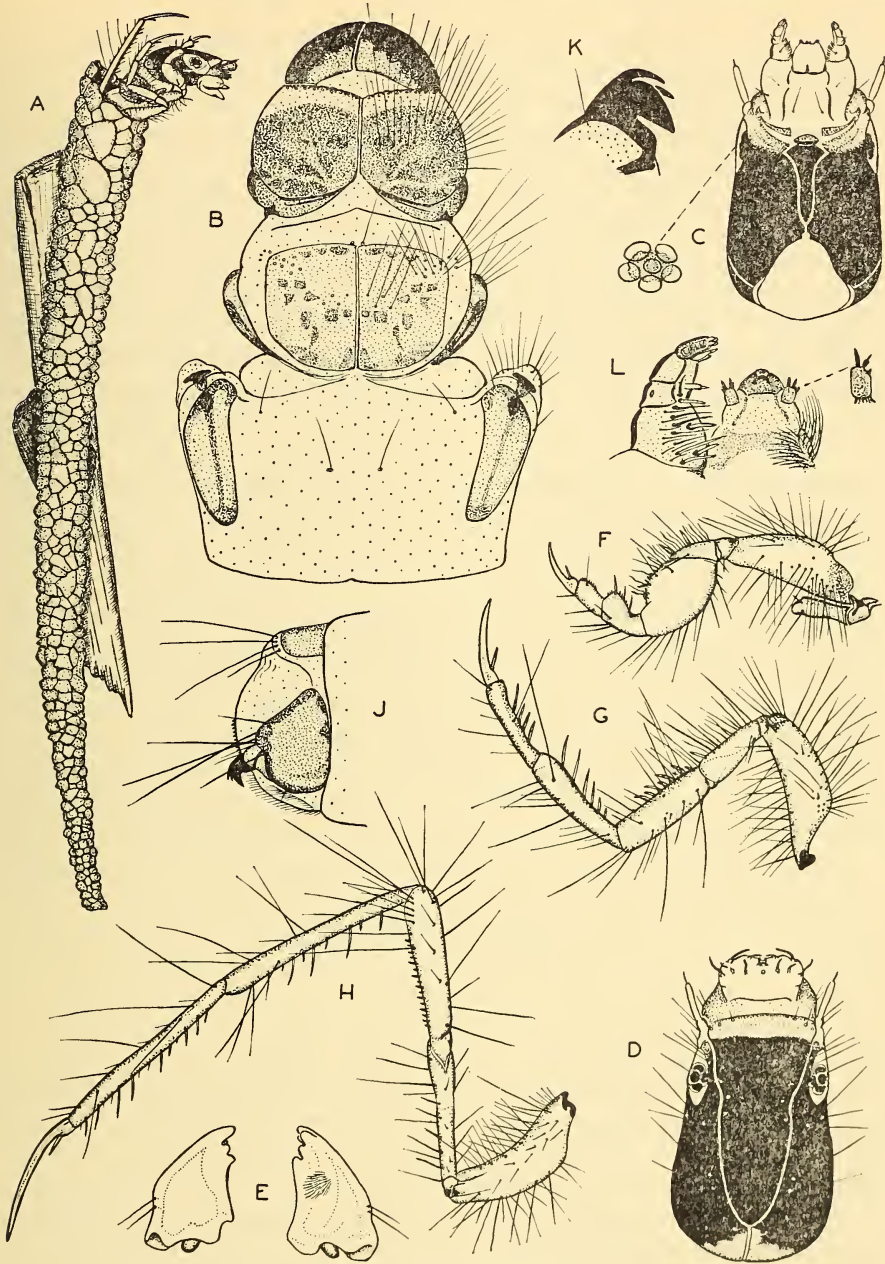


FIG. 2. Larva of *Athripsodes bergensis* Scott.

A, lateral view of larva in case. B, dorsal view of head and thoracic nota. C, head from behind showing gular sclerite, with eye further enlarged. D, dorsal view of head. E, right and left mandibles (ventral view). F, prothoracic leg. G, mesothoracic leg. H, metathoracic leg. J, lateral view of posterior end of larva (right side). K, anal claw. L, left maxilla and labium, with labial palp further enlarged. (Brushes of hair omitted from left side of labium.)

of mesh partly covered by sand-grains, so that the larval sclerites are retained in the pupal case. Ross (1944, p. 210) states that in the entire family (Leptoceridae) the pupal chamber has a slit and not a mesh in the closing cap at both ends; while this no doubt applies to the American members of the group, it is evidently not invariably the case in African species.

Reference to the tables and notes in Harrison and Elsworth (1958) and Harrison (1958) will show that these larvae were apparently much more widespread and common than is indicated here, having been recorded from stations 1 to 9, often at all seasons of the year, and from most types of substratum. It was found however on closer examination that the larvae collected included three slightly different types, probably of different species, though that remains to be proved. Only the records of larvae of the type actually bred out as *A. bergensis* have been given here. It is hoped that the other types will be correlated later on.

Larva (fig. 2 A-L): Described from entire specimens and from larval sclerites in pupal cases. Length of larvae up to 8.0 mm. *Head*: hypognathous, elongate oval, clypeus slightly asymmetrical with a single pair of lateral indentations and 12 setae; gular sclerite long, narrow, widening anteriorly, not fused with genae. Head capsule shining black except for conspicuous white patches surrounding the eyes, along the posterior margin of the head and the anterior border of the clypeus; anteclypeus, antennae and labrum pale yellow to brown in colour. Antennae long, stout, with small rounded basal segment and terminal sensory bristle. Eyes large and black, with 6 raised hyaline lenses as in *A. prionii* (fig. 2 C). Sutures round clypeus and gular sclerite, and suture-line parallel to epicranial arms, white and very conspicuous; maxillae and labium large, also white and very conspicuous. *Mouthparts*: labrum with 2 pairs of long, curved, blade-like marginal spines, also a smaller pair, centrally placed; a row of 6 setae across the upper surface and large brushes of setae on the lower. Mandibles strong, prominent, the left mandible with 5 blunt apical teeth and a brush of bristles on the inner face, the right mandible with 6 blunt apical teeth and no brush. Maxillary palps 3-segmented, with 4 apical papillae; maxillary lobe with a fringe of stout spines and setae along the inner margin. Labium a low cone with silk gland opening at tip; labial palps each tipped with a small distal segment bearing a sensory papilla and two spines. *Thorax*: pro- and mesonota sclerotized; pronotum brown to blackish, showing slight patterning and bearing long setae anteriorly, the posterior border separated by a groove from the rest. Mesonotum yellowish with a brown pattern as shown in figure 2 B. Metanotum membranous. *Legs*: prothoracic legs strong, fringed with spines and setae; stridulator with rounded tip and two small setae; meso- and metathoracic legs with long spines bordering tibia and tarsus, shorter spines along femur. All joints of one segment except trochanters which have two; femora of mid- and hind legs also show signs of division. Tarsal claws very long, specially on metathoracic legs, each claw with a strong basal bristle. *Abdomen*: very long compared with the head and thorax, tapering gradually, 2nd-4th segments widest. Large dorsal and lateral humps on 1st segment, each of the latter bears a lightly

sclerotized oval setose plate. Anal sclerite present on 9th segment, and just posterior to it 4 long brown bristles. At the base of each anal appendage there is a large sclerite with 4 strong bristles along its curved posterior edge. Anal appendages fused to form 10th segment. There are small spicules and tracts of hair lateral to the anus. Anal claws stout, each with a pair of auxiliary hooks, and with 2 small sclerites at its base. Feebly developed lateral line present from segment 3 to 7, followed by a row of chitinous points on 8. Gills absent.

Case (fig. 2 A): A long slender tube, length up to 11.0 mm., wider and hooded at the anterior end, rough-looking, made of variously sized brownish sand-grains, with a neat hole at the posterior end. A small stick or one or more pieces of charcoal is frequently attached to the case, making it rather unwieldy. The larva sometimes makes use of a hollow reed or an empty case, adding a hood of sand grains.

Pupa (fig. 5 D-J): Labrum prominent, somewhat angular, with very long, strong setae; mandibles small, slender, inner edge finely serrated, condyle small. Antennae very long, distal ends coiled, fore- and mid-tarsi fringed. Protuberances and dorsal plates present as in *A. prionii*, the presegmental plates usually with 4 teeth, occasionally 5 or 6; a pair of seta-bearing lappets on 9th segment. Strong lateral lines present from segment 3 to 8, where they meet ventrally. Anal appendages long and slender, with bifid tips; near tip of each, 3 long stout setae and several small processes.

Pupal case (fig. 5 A-C): Not an altered larval case, but a new cylindrical case made of small white sand-grains; closed at each end with a grating made of secretion, this is partly covered by two or three sand-grains. The larval sclerites are thus retained within the pupal case. The case is affixed along one side to the lower edge of a stone resting on clean sand near the margin of the stream.

Athripsodes tuckeri Barnard ? var.

Fig. 5 R-X

Pupa (fig. 5 R-X): Described from the pupal skin of the ♂ bred out in January 1955. Labrum low, rounded, with slight anterior point; most setae are missing, but those present are long and strong. Mandibles fairly short, with broad base and tapering blade, inner edge serrulate, outer edge sinuous, ending in a small condyle; one pair of lateral setae. Antennae long, distal ends coiled. Mid-tarsi fringed. Dorsal plates present on abdominal segments as in *A. prionii* and *A. bergensis*; 4-6 teeth on all presegmental plates. On 9th segment 2 small lappets tipped with setae; these lie on rounded lateral protuberances just anterior to each of which, but on the ventral side of the body, there is a patch of small scabrosities (fig. 5 X). Lateral lines extend from segment 3 to 8, where the two curl round and meet ventrally. Anal appendages long and slender, each tip a rounded spatulate lobe with three long setae arising from its base.

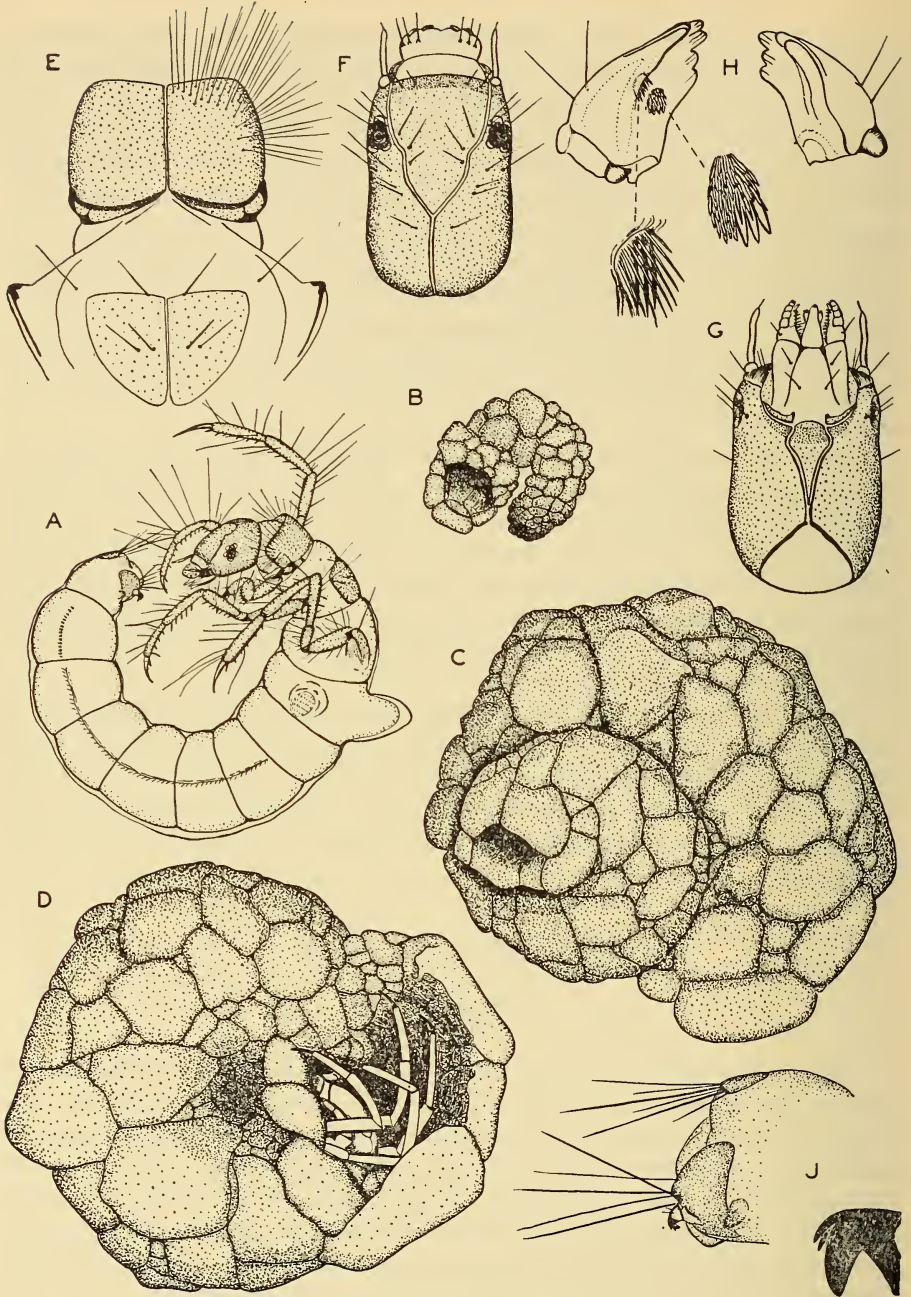


FIG. 3. Larva of *Leptecho helicotheca* Scott.

A, entire larva, mature. B, case of very young larva. C, case of mature larva, dorsal view. D, case of same, ventral view. E, dorsal view of pro- and mesothoracic nota. F, dorsal view of head. G, ventral view of head. H, left and right mandibles (dorsal view), with brushes on left mandible further enlarged. I, left mandible further enlarged. J, lateral view of posterior end of larva (right side), with anal claw further enlarged.

Leptecho helicotheca Scott

Fig. 3 A-J; fig. 4 A-P

Remarks: The larvae are fairly common in the Great Berg River near Driefontein and Groot Drakenstein from late spring to early autumn (November to March); a few were also found in August. Adults were captured or bred out from March to June. The larvae are crawlers with bright brown heads, living in small snail-shaped cases made from sand-grains, the cases being remarkably similar to those of species of *Helicopsyche*. *Leptecho helicotheca* larvae were not found making use of the cases of other Leptocerids, though occasionally other Leptocerid larvae were found inhabiting their discarded snail-shaped cases. *L. helicotheca* larvae appear to feed chiefly on vegetable matter on and under stones in comparatively deep pools and flats in parts of the river where the current is slow and the water clear. In autumn a few are also found living on the marginal vegetation. In captivity they can be reared successfully on algae-covered stones in aquaria, though judging by the size and position of their eyes it seems probable that they are actually omnivorous, including minute animals in their diet as well as algae. When about to pupate the larvae move close inshore; their pupal cases were found in autumn (March to May), clustered under the edges of marginal stones. The pupal cases are initially built as an extension to the larval case, but are straight, not coiled; thus, where they have been left undisturbed, each pupal case still has the larval case situated at one end; this facilitates recognition of the pupal cases, which are outwardly much like those of several species of *Athripsodes*.

Larva (fig. 3 A, E-J; fig. 4 A-D): Described from entire specimens. Length of fully grown larva approximately 3.0 mm., but the larvae are always curled round and not easy to measure accurately. *Head:* hypognathous, almost oblong; clypeus triangular, very wide anteriorly, short, with one pair of lateral indentations and 10 setae. Gular sclerite rounded anteriorly, tapering to a point behind, not fused with genae. Head capsule bright chestnut brown, with a slightly paler patch anterior to each eye; anterior margin of clypeus darker brown; sides of genae thickened and pitted, anteclypeus pale, labrum brown. Antennae long and stout, each with rounded basal segment and tipped with a sensory bristle. Eyes large, black, situated fairly far forward, with hyaline lenses as described in *Athripsodes prionii* and *A. bergensis*; there are however no suture-like lines paralleling the epicranial arms as in those species. *Mouthparts:* labrum with 2 pairs of curved blade-like spines and 3 pairs of long straight setae. Mandibles strong, the left one with 6 blunt apical teeth and two clumps of bristles on the inner face; the right mandible somewhat smaller, with 5 teeth and no bristles. Maxillary palp 4-segmented, with apical papillae; maxillary lobe fringed with stout spines and bristles. Labium a slender cone with silk gland opening at tip, labial palps stout, bearing papillae. *Thorax:* pronotum bright brown, sclerotized, setose, with the posterior border separated by a fracture line from the rest;

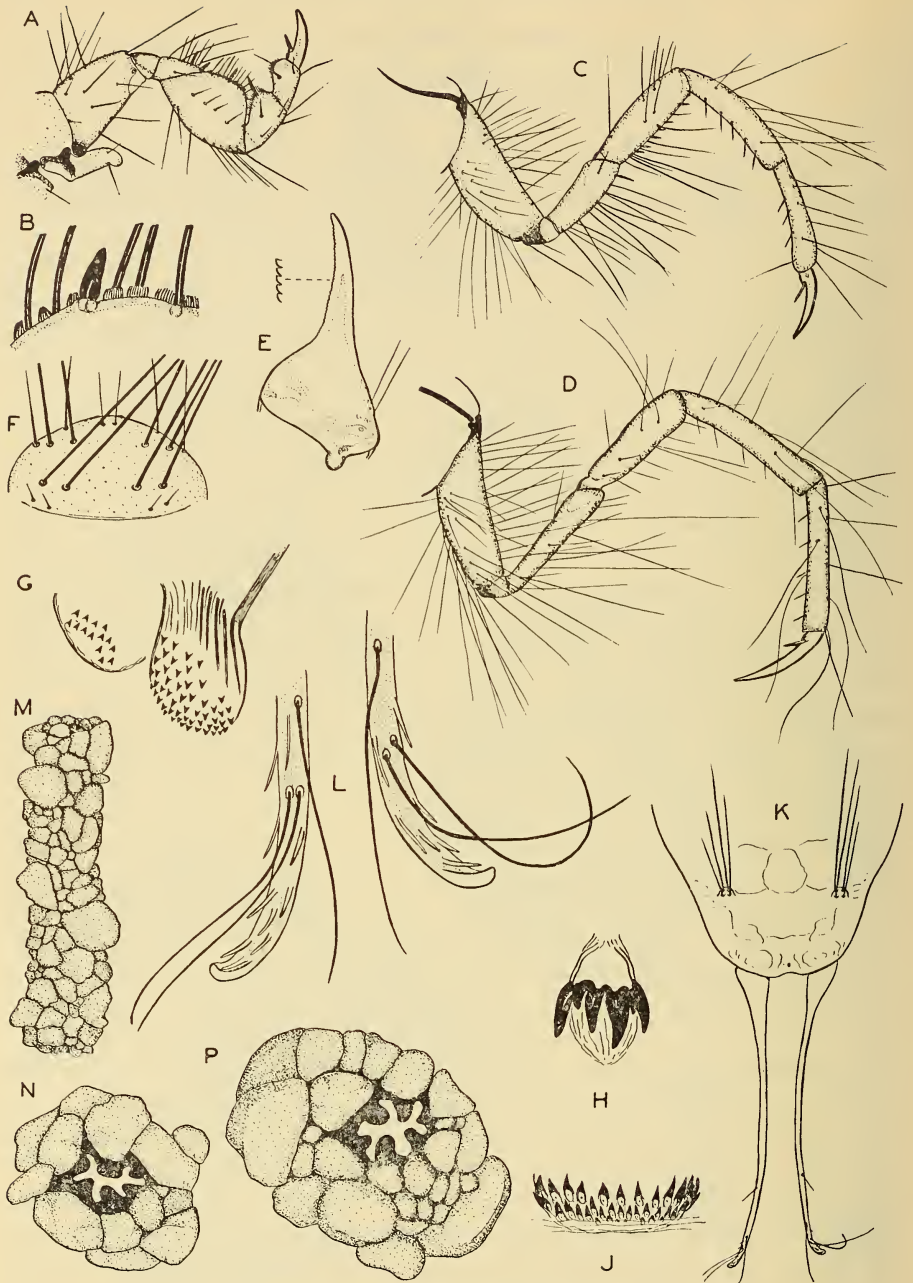


FIG. 4. Larva and pupa of *Leptecho helicotheca* Scott.

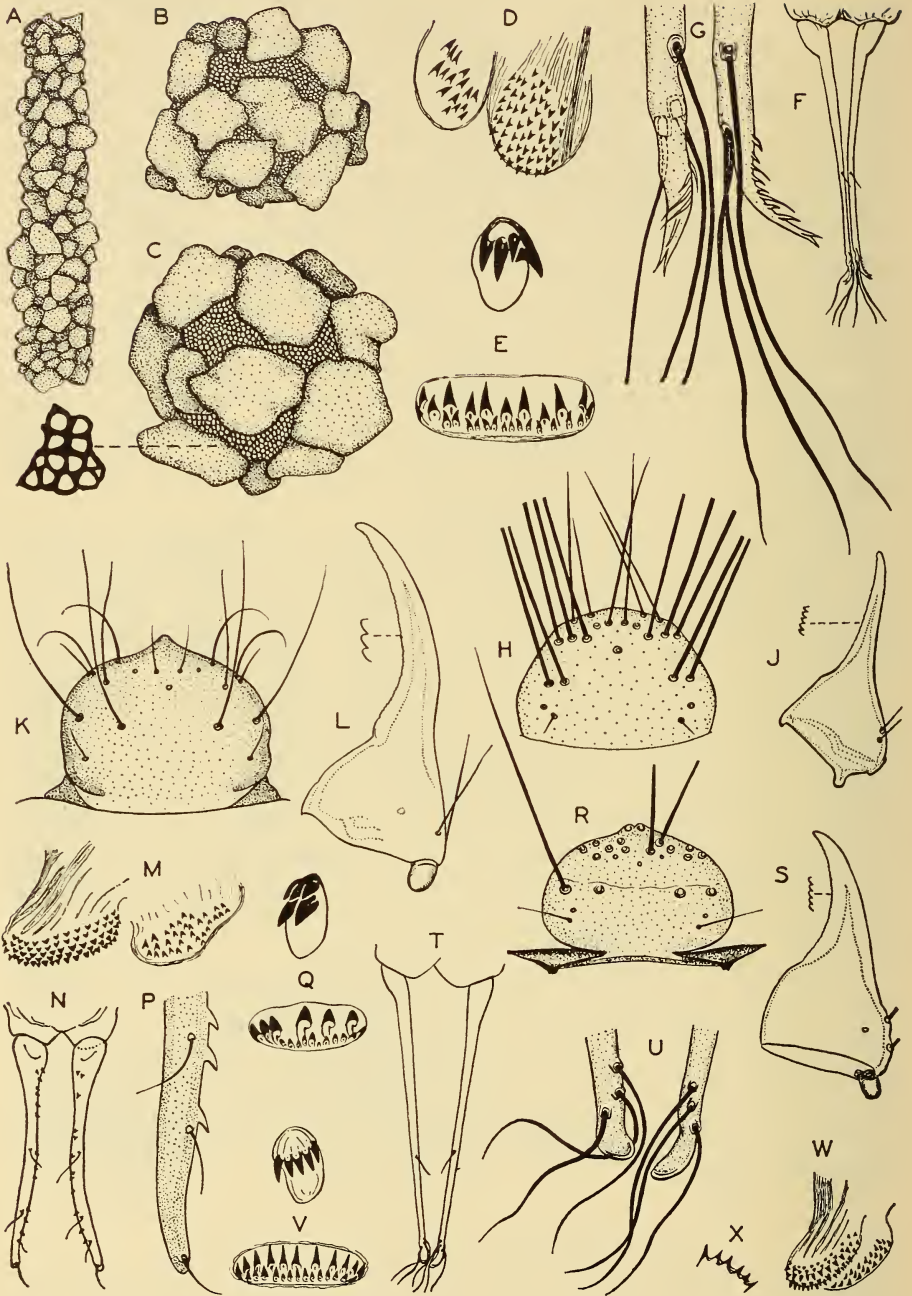
A, prothoracic leg of larva. B, portion of margin of femur further enlarged (long setae shown cut short). C, D, meso- and metathoracic legs of larva. E, mandible of pupa, with portion of serrated edge further enlarged. F, labrum of pupa (long setae shown cut short). G, dorsal lobes from 1st abdominal segment. H, presegmental dorsal plate from 5th segment. J, post-segmental plate from same. K, posterior end of pupal pelt, showing lappets and anal appendages. L, ends of anal appendages further enlarged. M, pupal case. N, lid from anterior end of same. P, posterior end of pupal case.

mesonotum with a pair of thinly sclerotized plates, pale yellow and unpatterned, each with 3 pairs of setae; metanotum membranous. *Legs*: prothoracic legs strong, tarsus and tibia each with a spine and a fringe of small hairs; femur and anterior portion of trochanter bordered with spines, long setae and short hairs (fig. 4 A and B). Stridulator blunt, with an upturned rounded apex and 2 small setae. Meso- and metathoracic legs with a few slender spines and long hair-like setae; metathoracic legs longest. All joints of one segment except the trochanters which have two, the femora of mid- and hind legs do however show a constriction near the proximal end which may indicate a division. Tarsal claws long and stout, each with a strong basal bristle. *Abdomen* light green, coiled round to fit case, with large dorsal and lateral humps on 1st segment, on each of the latter a pubescent, sclerotized plate. On the 9th segment an anal sclerite bordered posteriorly with bristles. Anal appendages fused basally to form 10th segment, a sub-triangular sclerotized plate at the base of each. Anal claws very small, each with a pair of minute auxiliary hooks. Gills absent. Lateral line strongly developed from 3rd to 7th segments, on 8th segment a long row of minute sclerotized points.

Case (fig. 3 B-D): A neat snail-shaped case, 2.5 to 3.0 mm. in diameter, made from variously sized sand-grains. The case is actually a tube, open at both ends, and is always a dextral spiral; the larger opening is neatly finished with smoothly rounded grains, forming a lip, next to which is an umbilicus. The earliest stage collected was just a small twisted tube (fig. 3 B).

Pupa (fig. 4 E-P): Labrum low, rounded, studded with long setae; each mandible with broad base and slender apex, inner margin minutely serrated, condyle small, one pair of lateral bristles. Antennae much longer than body, distal ends coiled; fore-tarsi slightly, mid-tarsi heavily, fringed. Dorsal plates present on abdominal segments as in *Athripsodes prionii*; all presegmental plates have 5-6 hooks. On 9th abdominal segment a pair of small lappets bearing long setae. Lateral lines extend from segment 3 to 8, where they curl round and meet ventrally. Anal appendages long and slender, with rounded recurved tips, set with slender spine-like processes and three long setae.

Pupal case (fig. 4 M-P): A straight cylindrical tube, roughly constructed of white sand-grains and lined with secretion. Length 6.0 to 6.5 mm.; a cap at the anterior end, edged with sand-grains and with a central membranous area perforated by a meandrine slit. There is a slit in the posterior end of the case, through which the larval sclerites can be ejected; this is similar to the slit in the lid. They are not however always ejected, some at least often being retained within the pupal case.



DESCRIPTION

Genus *SETODES* Rambur

- Rambur, 1842, *Hist. nat. Ins. Névr.*: 315.
 Milne, 1934, *Stud. N. Amer. Trich.*, 1: 18.
 McLachlan, 1879, *Rev. Syn. Eur. Trich.*: 338 (partim).
 McLachlan, 1884, 1st Add. Suppl.: 39-40 (group II).
 Mosely, 1939, *Brit. Caddis Flies*: 178 (group II).
 Kimmins, 1949, *Entomologist*, LXXXII, No. 1036: 201-4.

Setodes barnardi sp. n.

Fig. 6 A-J; fig. 7 A-J; fig. 8 A-L

A very small dusky gold species with narrow, pointed wings and annulate antennae. The larvae are crawlers inhabiting neat tubular sand cases. I have pleasure in naming this species in honour of Dr. K. H. Barnard, pioneer worker on South African caddis flies.

Imago (dry, before putting into alcohol) (fig. 6 A-J): *Head*: dusky gold with pale gold or white tufts of setae, sometimes interspersed with a few black setae; antennae more or less strongly annulate black and white basally, about twice wing length, basal segment as in figure 6 J. Eyes blackish, large. Maxillary and labial palps fuscous. *Thorax*: dusky gold, with paler gold or white shoulder tufts with a few black setae. *Legs*: tibial spurs 1, 2, 2; spur on fore-leg very small, spurs on mid- and hind-legs unequal in size, the outer one on the mid-leg being very short and on the hind leg over half the length of the inner. Fore-legs brownish, mid-legs paler, hind-legs pale gold. *Abdomen* yellowish. *Wings* (fig. 6 A, B): length of ♂ fore-wing 4.0 mm., of ♀ same. ♂ fore-wing long, narrow, apex acute; membrane clear, slightly iridescent, somewhat thickened in the pterostigmal area; pubescence plain dusky gold, a long fringe along the posterior border; apical forks 1 and 5 present, stalk of fork 1 approximately equal to R₂; media forks well beyond the anastomosis; thyridial cell long and very narrow, anastomosis irregular, not clearly defined. ♂ hind-wing narrower than the fore-wing, acute, membrane clear, pubescence thin and pale, wing fringes very long (fringe along posterior border nearly as wide as wing); only fork 5 present; base of Rs obsolete. ♀ wings similar, slightly wider.

← FIG. 5. Pupae of *Athripsodes bergensis* Scott (A-J), *A. prionii* Scott (K-Q),
A. tuckeri (Barnard) ? var. (R-X).

A, pupal case of *A. bergensis*. B, lid of same. C, posterior end of case, with portion of grating further enlarged. D, protuberances on 1st abdominal segment of pupa. E, anterior and posterior dorsal plates of 5th segment. F, anal appendages. G, tips of anal appendages further enlarged (setae of left side cut short). H, labrum (long setae shown cut to half actual length). J, mandible. K, labrum of *A. prionii*. L, mandible of same. M, protuberances on 1st abdominal segment. N, anal appendages. P, tip of anal appendage further enlarged. Q, anterior and posterior dorsal plates of 5th segment. R, labrum of *A. tuckeri* ? var. (most setae missing). S, mandible of same. T, anal appendages. U, tips of same further enlarged. V, anterior and posterior plates of 5th segment. W, protuberances of 1st abdominal segment. X, scabrosity from patch on ventral surface of abdomen.

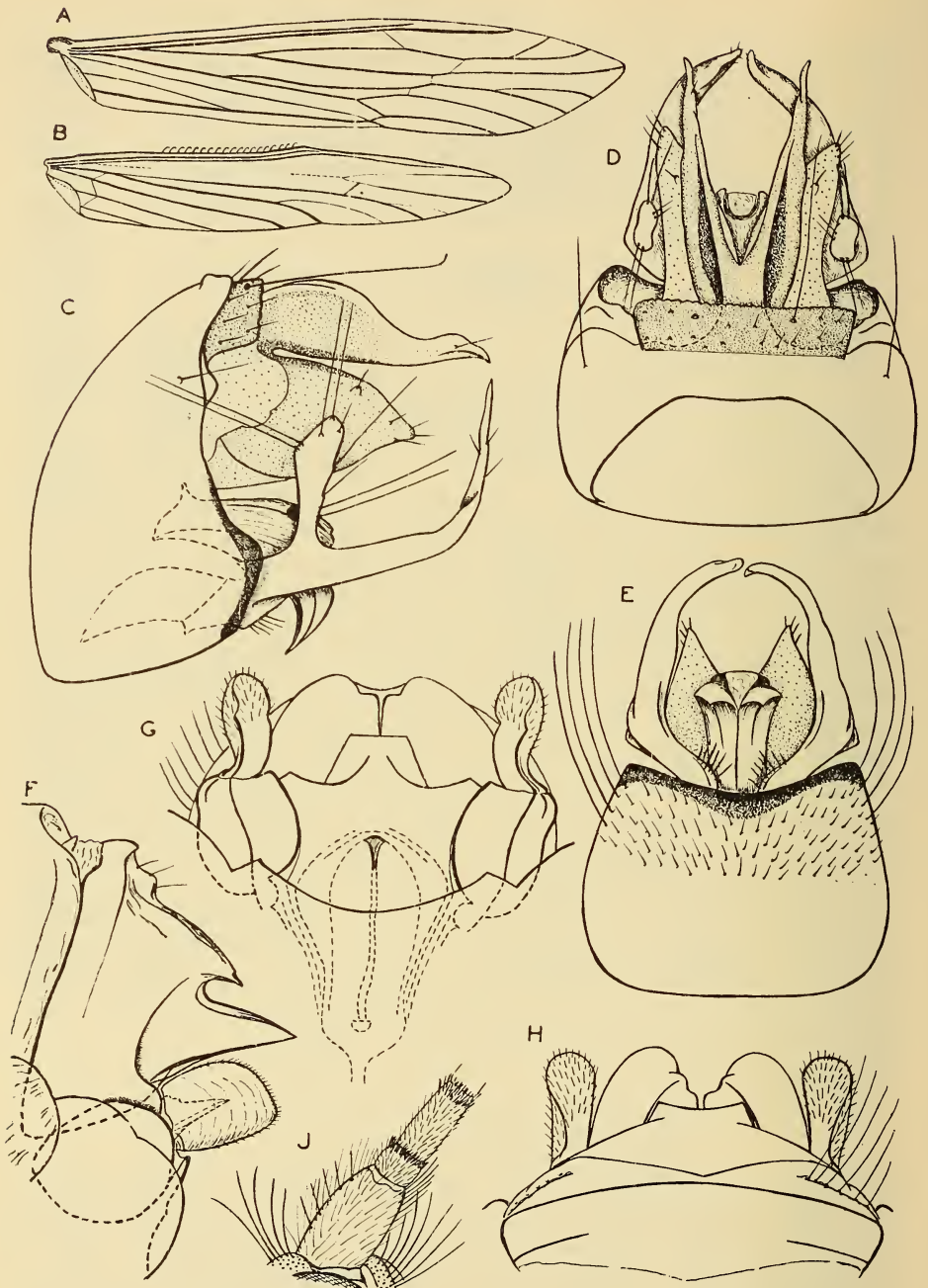


FIG. 6. *Setodes barnardi* sp. n., ♂ and ♀ imagos.

A, B, fore- and hind-wings of ♂. C, D, E, lateral, dorsal and ventral views of ♂ genitalia.
 F, G, H, lateral, ventral and dorsal views of ♀ genitalia. J, base of ♂ antenna.

Genitalia ♂ (fig. 6 C-E): Ninth segment narrow dorsally, broad ventrally, ventral margin (in lateral view) convex, slightly hairy, side-pieces slightly produced, thickened marginally, set with long coarse setae; in ventral view the posterior margin of the sternite is slightly excised and heavily sclerotized. Dorsal apical margin produced as a narrow transverse band, sparsely setose, which overlies the 10th segment. Apical margin of 10th segment produced to form a pair of long processes; these are joined basally, widely separated apically, with a V-shaped emargination between them. Each process forms a thin, curved, vertical plate, sinuous in lateral view and ending in a sharp beak-like apical point. Beneath these the lower part of the 10th tergite is divided to form a pair of large, deep, transparent upper penis covers; these are sub-triangular in lateral view, and in dorsal view they end in blunt points close to or overlying the claspers. Each bears a few setae and a small dorsal process tipped with a seta.

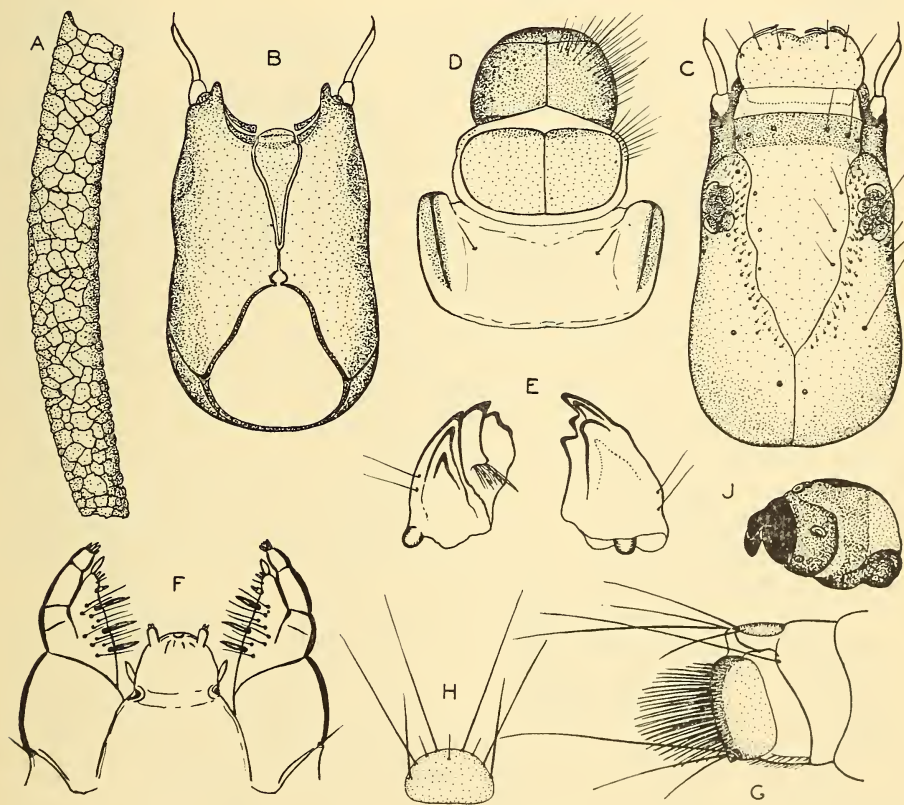


FIG. 7. Larva of *Setodes barnardi* sp. n.

A, larval case. B, head of larva from behind showing gular sclerite. C, dorsal view of head. D, dorsal view of thoracic nota. E, left and right mandibles from above. F, maxillae and labium. G, lateral view of posterior end of larva (right side). H, dorsal sclerite of 9th segment. J, anal claw.

Aedeagus short, stout, downcurved, with a U-shaped sclerotized thickening. Beneath it lie the paired, down-curved lower penis covers, ending in triangular points. Claspers bent inwards, two-branched; the main part extends backwards, then turns sharply inwards and upwards, ending in a sharp point; the branch arises about a third of the way along it, and is upwardly directed, with a narrow base and wider, triangular apex; it bears a number of strong setae.

Genitalia ♀ (fig. 6 F-H): Eighth sternite flattened, ending in a wide shallow excision; ninth sternite hollowed, with lateral margins of tergite forming flaps on each side; ninth tergite transversely ridged, sparsely setose, fused to the 10th tergite which is rounded, with the central third backwardly produced and emarginate; in lateral view it is beak-like. Below this are paired, hollowed out, sclerotized plates, dorsally ridged, sharply triangular as seen from the side. Lateral gonapophyses of 9th segment scoop-shaped, pubescent; between them another plate, in lateral view sharply pointed, in ventral view a truncate triangle.

♂ holotype in alcohol, the genitalia mounted as a microscope preparation. ♀ paratype and ♂ paratypes in alcohol.

This species is easily recognizable by the fact that fork 1 is lacking in the posterior wing, only fork 5 being present, and by the tibial spurs, which are 1, 2, 2, instead of 0, 2, 2; the spur on the fore-tibia is small. The ♂ genitalia also differ considerably from those of other African species of the genus, showing most resemblance to *S. baccata* Kimmins; the ♂ however lacks cerci and shows greater complexity in the development of the 10th tergite, the 9th sternite is much broader and the main branch of the clasper differently shaped.

After much consideration it appeared best to include this species in the genus *Setodes*, in spite of the fact that it differs from the generic diagnosis as given by Kimmins (1949) in two respects, namely the absence of fork 1 in the hind wing, and the presence of a small spur on the fore-tibia. Mr. Kimmins has kindly informed me (personal communication) that his species *S. baccata* also has a minute spur on the fore-tibia. In the other species of *Setodes* (restricted sense) so far described, fork 1 is always present in the hind-wing, although it is often quite small. In all other respects however *S. barnardi* appears to be a typical *Setodes*, so has been included in that genus.

Locality: Larvae were collected from the Great Berg River near Driefontein in October; adults were bred out in the laboratory from some of these larvae as follows: October 1956, 1 ♂, 1 ♀; December 1956, 1 ♂, 1 ♀; January 1957, 1 ♂, 1 ♀. Most of the larvae were collected from the trailing marginal palmiet (*Prionium serratum*), a few were found living under stones in the stickles.

Larva (fig. 7 B-J, fig. 8 A-C): Described from entire specimens. Length of larvae up to 5.0 mm. *Head*: hypognathous, small, almost oblong, clypeus asymmetrical with 2 to 3 pairs of lateral indentations and 12 setae; gular sclerite rounded anteriorly, tapering to a point posteriorly, not fused with genae. Head capsule and labrum light golden brown, set with small setae near the margin of the clypeus. Antennae long, with small basal segment and tipped

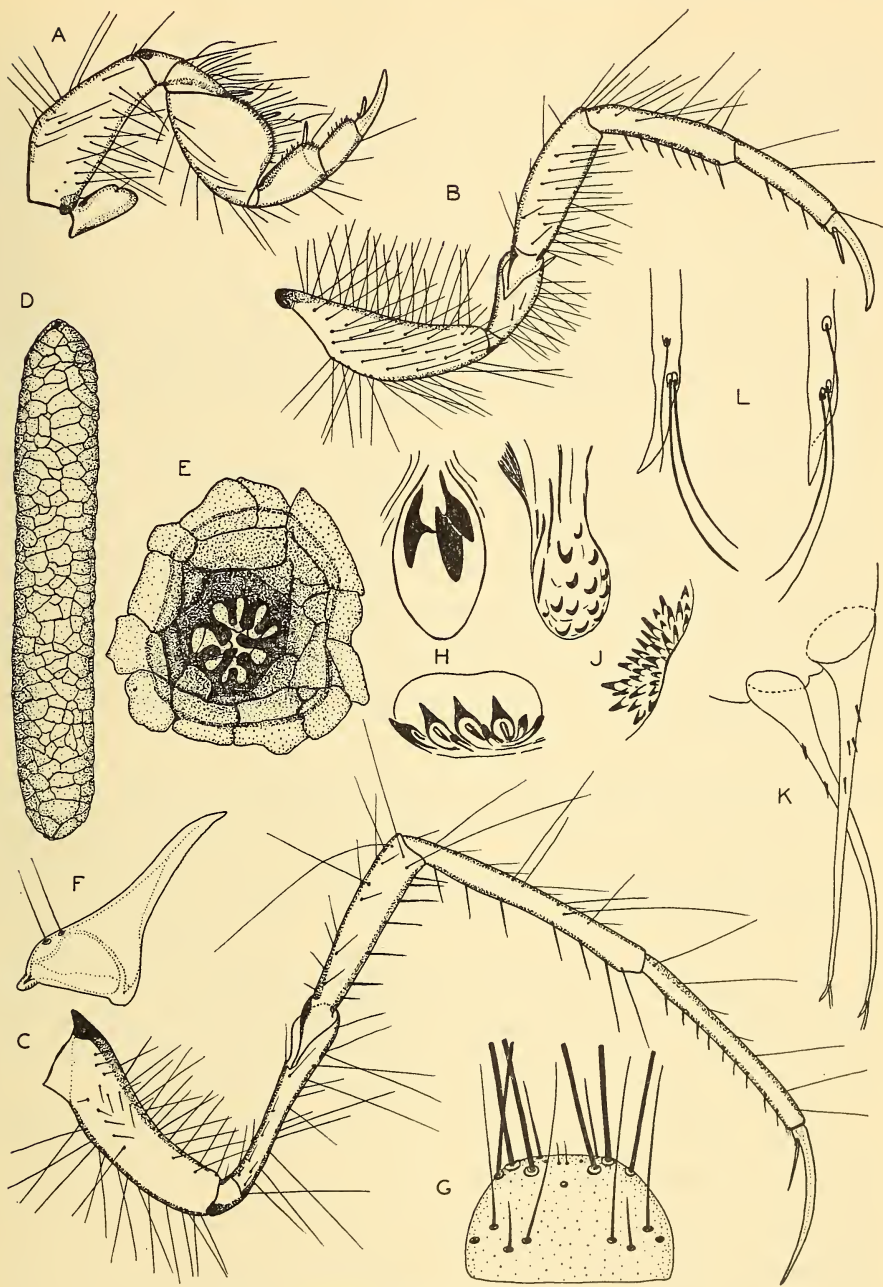


FIG. 8. Larva and pupa of *Setodes barnardi* sp. n.

A, B, C, fore-, mid- and hind-legs of larva. D, pupal case. E, lid of same (inside view). F, mandible of pupa. G, labrum (long setae cut short). H, pre- and postsegmental dorsal plates of 5th abdominal segment. J, protuberances from 1st abdominal segment. K, anal appendages. L, tips of anal appendages further enlarged.

with a sensory bristle. Eyes large, dark, set well forward, with a pale patch just behind each, and beneath hyaline lenses as in the other species described. Suture-like line present paralleling the epicranial arms. *Mouthparts*: labrum with two pairs of blade-like bristles anteriorly and 3 pairs of longer setae across the top. Mandibles strong, short, heavily sclerotized, each with 5 blunt teeth, the left mandible with a brush of strong bristles on the inner side. Maxillary palp 3-segmented, with apical papillae, junction with maxilla indistinct; maxillary lobe fringed with setae and blade-like bristles. Labium rounded, with silk gland opening at tip, labial palps stout, tipped with papillae. *Thorax*: pronotum light brown, sclerotized, setose, with lateral fracture separating posterior edge; mesonotum with a pair of thinly sclerotized yellowish-grey plates; metanotum membranous, with an irregular band of setae across the ventral side. *Legs*: small, slender, yellowish in colour, set with setae and bristles as in figure 8 A-C, but without special swimming hairs. Femora and trochanters of mid- and hind-legs divided, also trochanters of fore-legs; tibiae and tarsi undivided; claws long and strong, each with a basal bristle. Stridulator large, stout, blunt, with a small seta. *Abdomen*: long, white, thick, without gills, lateral line very poorly developed, chitinous points on segment 8 present but minute. On the 9th segment a semicircular dorsal sclerite bordered posteriorly with setae. Anal appendages fused to form 10th segment, anal claws minute, blunt, at the base of each a large rectangular plate which is armed posteriorly with a frieze of strong brownish-black spines set in 5-6 parallel rows. Anus flanked by rows of small colourless setae.

Case (fig. 7 A): A neat, slender, curved tube about 5.0 mm. in length, of small yellowish sand-grains, open at the ends and slightly hooded anteriorly.

Pupa (fig. 8 F-L): Labrum rounded, set with long bristles and smaller setae; mandibles small, minutely serrulate along the distal third of the inner border, condyles lateral; one pair of lateral bristles. Antennae much longer than body, distal ends coiled; mid-tarsi broad and heavily fringed. Dorsal plates present on abdominal segments as in *Athripsodes* species described; all pre-segmental plates have 3 teeth. On 9th abdominal segment a pair of setose lappets; these are set on raised humps. Lateral lines extend from segment 3 to 8, where they meet ventrally. Anal appendages slender with a few spines on the proximal half; tips pointed and proximal to them 3 strong setae.

Pupal case (fig. 8 D, E): A cylindrical tube about 5.5 mm. long, neatly made of yellowish sand-grains and pointed at both ends; a small opening is left between the terminal sand-grains at each end, this is guarded by a membrane whose inner edge forms stiffly projecting flaps. The result is rather like the meandrine slit found in *Leptecho helicotheca*, but in *Setodes barnardi* the slit is not visible from outside, being completely roofed over by sloping sand-grains with only narrow cracks between them. In the diagram (fig. 8 E) the lid of the tube is shown from the inside, and the band of secretion which fastened it to the case can be clearly seen. The case is not completely lined by secretion, the secretion merely being used to cement the sand-grains together.

SUMMARY

A new species of caddis, *Setodes barnardi* sp. n. (Trichoptera: Leptoceridae), is described from South Africa, together with its larval and pupal stages; also the larval and pupal stages of *Athripsodes prionii* Scott, *A. bergensis* Scott, and *Leptecho helicotheca* Scott, and the pupal skin of *A. tuckeri* Barnard ? var.

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